demonstrated a safe and reliable test. It is based upon the formation of a turbid ring at the junction of two sera, the one taken from an active syphilitic the other obtained from a late convalescent or one in the ataxic stage. This method appears to be promising, for it certainly has simplicity to commend it and so should soon receive enough attention to bring out reports that will be conclusive. The last few years have shown marked advances in our knowledge of this aggravating disease, and from the present general interest in the work on syphilis we may safely predicate still further and more valuable discoveries in the immediate future.

"CAN THIS BE TRUE?"

In asking this question, the *St. Louis Medical Review* refers to an editorial published in this JOURNAL some little time ago in which the statement was made that no physician had the knowledge or the ability to determine whether or not the statements of a manufacturer in regard to his preparation were true or false. Physicians are not chemists; nor yet are they pharmacologists, and if they were they are far too busy to undertake long and tedious analyses to find out the composition of the remedies they are asked to use. This work the Council on Pharmacy and Chemistry does, gratuitously, for the whole medical profession, and the JOURNAL urged that we should believe only the Council, for the reason that all manufacturers had, at some time and in some instances, lied to us. The JOURNAL said "You cannot depend on your own judgment, for you do not know enough to judge." Once more we submit that that statement is absolutely true. The *St. Louis Medical Review* was, at one time, edited by a scholarly gentleman; one who knew, as the present editor does not, that the first rule of journalism is to refrain from mentioning the editor of a publication by name. We do not know who the present editor is, and in spite of his threat that we shall "hear from him in the shape of physical retaliation," we beg to advise him that he brays like a Rocky Mountain nightingale and that *he* is absolutely incompetent to judge of the composition of the remedies he is asked by the manufacturer to use. As he advertises, among others, anasarcin and the Peacock line of nostrums, however, we suspect that his judgment is all right when it comes to determining the number of cents in a dollar. On your way, and trouble us no more.

HEMATURIA WITH REPORT OF CASES.*

By GRANVILLE MacGOWAN, M. D., Los Angeles.

The manifest presence of blood at the mouth of the urethra, or mixed with the urine, is a symptom which alarms the person in whom it occurs, and not infrequently terrorizes his medical attendant. To be of value any treatment for this condition must follow upon a knowledge of the source of the hemorrhage.

Until of very recent years there was much of the occult about hematuria. With most learned and scientifically ponderous reasoning, consulting physicians, commonly by deductive analysis, fixed upon the bleeding spot, and then often, by operation, or post-mortem section, proved what poor guessers they were. This good work still goes on, though the means exist by which surmising as to the origin of the hemorrhage is, except in the rarest instances, rendered unnecessary.

By the agency of urethrascopes and cystoscopes of various patterns it is readily possible to explore the urethra, the bladder, the ureters and the pelvis of the kidneys, and exact information of the cause and the place of a hemorrhage of the genito-urinary tract may be obtained in nearly every case.

In many books rules for differential diagnosis in cases of hematuria may be found: by the color of the blood; the size and shape of the clot; the chemical analysis of the urine; whether the blood precedes, is mixed with, or follows the urinary stream; the source of the hemorrhage is sought to be established. None of these features have any exact worth, for hemorrhage from a kidney may be so profuse that it is pissed almost arterial in hue, being very rapid, one bladderful may be hardly expelled before the necessity of urinating is again present.

It is true that when blood appears at the meatus in intervals of urination the source of the hemorrhage is nearly always in front of the deep transverse perineal muscles; but to this there are frequent exceptions, many of them striking.

1. 2/25/08. S. M., 82 years old, retired merchant, sent to me by Dr. Rogers of Tucson, has retention and profuse hematuria. Two months ago his first hemorrhage occurred suddenly and was followed by retention. He has had three attacks; the present one has now lasted a week, and has been very severe —the urine is full of clots. There is retention to 400 cc's. He strains, and passes a little urine at times. Blood appears, sometimes, at the meatus, in the intervals between urination or the use of the catheter. 2/27/08. Perineal section, and removal of a carcinomatous prostate; the left half of the prostate was already loosened from its capsule and nearly destroyed by the disease. He was up and about in ten days with the wound closed. At the end of the second week renewal of the hemorrhage tenesmus, and invasion of the perineal scar by the growth, necessitated sectio alta and permanent drainage, since which he has been comfortable.

When blood suddenly appears, at or toward the end of urination, in a previously clear stream, it is reasonable to place its origin, either in the bladder close to the outlet, or within the prostatic urethra,

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*Read at the Thirty-Eighth Annual Meeting of the State Society, Coronado, April, 1908.

or from the prostate. It is often of importance that this shall be accurately determined, and it can only be done by the use of an instrument through which we can see; for sometimes, in a typical condition of this sort, the blood comes altogether from points anterior to the membranous urethra.

2/6/08. Mr. B. B., 40 years of age, rancher, single; sent by Dr. Sheppard. In January, 1908, he noticed smarting upon passing urine, this was followed in a week by painful hematuria, the blood apeparing toward the end of urination. His general health had been bad for two months, and he had lost fully fifteen pounds in weight. Inspection of the urethra through a small endoscope, 20 F., showed many granular patches, which ceased in the posterior portion of the bulb. The right side of the prostate was harder than the left. When urine was passed in three glasses, the centrifuged sediment of the last glass did not contain any blood. Search for tubercle bacilli, and the guinea pig test proved negative. The hematuria has ceased, and his general health appears to be restored by gradual dilation of his urethra and the application of strong silver solutions, through the endoscope, to the granular patches.

It is also true that, often, in moderate hemorrhage from a kidney, at intervals the blood coagulates in the ureter, and lies there long enough to become partially fibrinous before it is dislodged, causing the appearance of long, thin, fishworm-like clots in the urine from time to time; but I have seen very similar clots occur in slow hemorrhage from villous growths situated in the bladder near the ureteral mouths, where the jets of urine projected steadily against the bleeding point caused the clot to wave back and forth in the urine, like kelp in the rise and fall of the tide. I have seen a slow hemorrhage from an overlarge, congested or ulcerated, verumontanum, which blocked up the natural free passage from the prostatic urethra to the bladder, prevented the flowing of the effused blood into that viscus, and hindered any forceful outflow of urine at the time of emptying the bladder, produce clots, that in no way could be distinguished from those which form in the ureters.

In the course of extra peritoneal operations for renal hemorrhage I have several times watched the blood issue from the pelvis of the kidney and pass down the ureter in a long undulating series of successive small clots, or descend in frequent waves which did not clot at all.

2. Dec. 8/1900, H. E. W.; 35, patient of Dr. Stoddard; occupation merchant; had a profuse painless hematuria in 1892 following heavy lifting; this was repeated later after an exciting coitus but ceased without treatment. Two months ago, after a fever accompanied by chills, there came an attack of dysuria—and the appearance of blood in the urine at the end of urination. The hematuria in a few days became profuse, was accompanied by paroxysmal pain in the back, and tenderness on pressure, particularly in the right side. In two months he had lost thirty pounds and become gravely anemic. Upon cystoscopic examination blood was seen coming from the right ureter. October 22nd nephrectomy through an Abbé incision. The ureter was inspected on the up-rolled peritoneum. Blood could be seen coming out of the pelvis of the kidney and passing down the ureter in interrupted spurts; it would clot about halfway down, and the clots then squeeze toward the bladder, their place being taken immediately by those following. This kidney was soft, deeply congested, and bled inordinately upon section. It looked purpuric. Many sections from it were examined by Dr. Black; no definite pathological change was found in it. But the man got well, and remains perfect in health until this writing.

The seat of hemorrhage may be: 1. The anterior urethra; 2, posterior urethra and prostate; 3, seminal vesicles; 4, bladder; 5, ureter; 6, kidneys.

Hemorrhage from the anterior urethra may arise from: mechanical injury, gonorrhea, stricture, warty growths, tuberculous ulcers.

(2) Hemorrhage from the posterior urethra may arise from: enlarged or inflamed verumontanum, posterior urethritis, inflammations of the prostate; which may be gonorrhœal, tuberculous, from mixed infections; or arise from syphilitic gummæ or cancer, stone or mechanical violence; and the source of the blood may be a seminal vesiculitis.

3. Hemorrhage from the bladder may arise from: cystitis, usually trigonal; edema of bladder neck and interureteral fold; ulceration of projecting adenoma of the prostate, non-malignant; stone; tuberculous ulceration; simple ulcer; patchy gonorrheal cystitis; talangiectasis of the posterior slope between the vesical outlet and the ureteral openings; new growths, simple and malignant; bilharzia; mechanical violence, frequently from sounding.

4. Hemorrhage from the kidneys may be from: tuberculosis; essential or without appreciable cause; nephritis; violence; stone, sometimes in form of uratic or oxalate showers; malignant growths; papilloma, angiomatous degeneration of a papilla; disease of the adrenal; movable kidney.

5. Or hemorrhage may arise solely from diet, drugs, hemophilia, or degeneration of the blood due to disease, as in variola, typhoid and malaria.

6. Hemorrhage from the ureter may come from the presence of stone; new growths; tuberculosis.

V. Hemorrhage from the anterior urethra due to mechanical violence is commonly either self-inflicted, occuring in the very young from harsh handling of the penis or the introduction of articles used for purposes of masturbation, or curiosity; or follows in the adult from narrowing of the channel by the cicatricial contracture of stricture, and sometimes quite severe hemorrhages follow the introduction of sounds or exploratory instruments, even when the greatest gentleness is observed. Again, in many cases of stricture the hemorrhage takes place before the introduction of any instrument and is, whether it be little or great, the source of the seeking of surgical advice.

4. 4/1/08. J. E. B., 66 years old, a strong and healthy man, had two months ago an alarming hemorrhage from the urethra, following urination, but without any antecedent symptoms. He consulted a surgeon who catheterized him, gave deep urethral instillations, assured him that his trouble was an enlarged prostate, and prepared to operate upon him therefor. Lack of confidence in his adviser, brought him to me. I found a stricture 18 F., at the meatus, and a much tighter one, 14 F., 12 cm. from the meatus, which bled as the searcher passed through it. The prostate and vesicles were abnormally small and soft, through the rectum. There was no residual urine. The strictures were cut freely, by internal urethrotomy and through an in-

cision made at the apex of the prostate, for drainage and exploration, by touch and by sight, the prostate and vesical neck were found to be entirely healthy.

5. 1/10/08. C. W. S., mining broker. Has recently noticed loss of sexual desire and has some blood in the urine; urinary frequency, diurnal 7-8, nocturnal 3-5; has been in habit of withdrawal or using a rubber condom in coitus; has tight multiple urethral strictures, 16 to 22 F., in anterior urethra, which bleed freely upon being disturbed with anything. Gradual dilation, and the application of 25% solution of silver nitrate through a small endoscope, overcame the hemorrhage, and has restored his waning sexual power.

It is not necessary to dwell upon the hemorrhage in the acute stage of gonorrhea; or in rupture of the anterior urethra; as the source of the blood in the urine is obvious in these cases. Growths within the urethral canal are nearly always warty or polypoid; either may bleed freely at times; and the locating of the resulting hematuria, without optical search of the channel, may be quite puzzling, for, if it be free, it may be sufficient to color the urine in all three glasses.

6. 2/16/08. C. A. B., capitalist, 36 years old, has morning drop and occasional bloody urine. He has had several sharp attacks of hematuria, blood being present at the start, during, and after the finish, of the act. He was supposed to have a growth at the vesical outlet. Examination with the urethroscope discovered the presence of a small polypus just in front of the triangular ligament. This disappeared after several cauterizations with 25% solution of silver nitrate.

Tuberculous ulceration must be taken into account in estimating the probable cause of the presence of blood in the first flow of urine. The diagnosis is commonly easily made by the fact that such disease almost never stands alone, but is a sequel to a long advanced tuberculous disease of the urinogenital tract higher up.

If the blood comes from some trouble in the urethra posterior to what is called the cut-off muscle, in the absence of an unduly large or congested verumontanum, or of an inflammation of the prostate with its accompanying pain, some of it finding its way into the bladder, renders an opinion of its origin uncertain. An expression often heard in diagnosing the source of a hematuria is, "it comes somewhere from the neck of the bladder." That somewhere may be: anywhere in the urethra posterior to the deep transverse perineal muscles; in the substance of the prostate; within the drawstring of the mucous membrane covering the muscular tissue of the inner sphincter of the bladder; or in the mucous membrane of the bladder, and within 6 cm of its outlet. Such hemorrhages may be painful. Whenever the basis of their cause is an acute inflammatory condition they are painful; sometimes excessively so as is illustrated in acute gonorrheal affections of this region, in tuberculous ulceration, and in calculus impacted within the entrance of the urethra, or lying in the trigone. In confirmed masturbation, or in those subject to any prolonged irritation that occasions rapidly repeated congestion of the sexual centers, an enlargement and permanent congestion of the caput gallinaginas takes place. This slows and obstructs the flow of urine, and the spasms induced by efforts to expel the last few drops often give rise to noticeable hemorrhage at the end of micturation; and from continuance of the hemorrhage in the intervals, the blood may flow back into the bladder, and also clot in a long plug in the urethra, giving rise exactly to the phenomenon of fish-worm clotting one sees so often in hematuria from a renal source. A feeling at the end of urination of "something in the urethra like a cork," and a burning pain over the pubic bones is often complained of.

7. 3/27/08. W. T. C., 47 years old, grain buyer, has great urinary frequency, suffers from emissions and has at times bloody urine, the blood preceding, being mixed with and following urination. In addition there is strain, and a feeling for fifteen minutes after urination, of the presence of a body about the size of a pea in the posterior urethra.

Urethroscopic examination shows the bleeding to come from a large verumontanum which contains a tumor the size of a small pea. This I shall remove later through a perineal incision.

There is often a high grade of tenesmus in these affections of the bladder neck, and in no instance is it exemplified better than in cases of calculus in which the stone is shaped more or less like a letter L, one branch being formed in the prostatic urethra, occupying and distending the vesical outlet and joined, in the sensitive trigone, by a cross branch which may be partially imbedded in the bladder wall. I have seen three cases of this kind. They all had bloody urine and led lives of continuous torture. They all leaked after the removal of the stone.

8. 8/25/07. M. C., farmer, 58 years old, patient of Dr. Garcelon. Has had severe dysuria, and at times hematuria, for several years. Recently the tenesmus has been unbearable, and the pus and blood abundant. His health has failed rapidly from pain and loss of sleep. The calculus can easily be felt with a stone sound in the prostatic urethra. 8/27 Lithotomy:—median perineal incision. The stone was large and imbedded in the left side of the prostate, and was continuous, through the neck of the bladder, with a large branch that was imbedded in the wall of the bladder on the left side of the base. It was a hard and extremely rough phosphatic calculus and was crushed and removed with difficulty. Recovery from the operation was speedy, but the full power of retention has never been restored.

Ulcerated syphilitic gummata, malignant growths, and mixed infections of the prostate, in addition to the diseases already mentioned, act as the causes of the appearance of blood in the urine. Gumma of this region are rare. I have seen two; both ran a typical course, occurred in men past the prime of life, were painless, and were accompanied by lessened sexual power, which was really the cause of the patients' anxiety. The hemorrhage was slight, but present in any specimen of urine passed until the disappearance of the lesions. Both required long use of iodine and mercury, in addition to massage and the application of silver solutions to the ulcerated prostatic urethra, through the endoscope. As an instance of mixed infection with ulceration the following case may serve to illustrate.

9. 8/17/07. J. R. S., 40, merchant, widower; sent to me by Dr. Hunter. Had gonorrhea two years ago, with extension to prostate, bladder and epididymis.

Has seen no discharge for more than a year, but the wish to marry again has made him desirous of ascertaining if the cure has been complete. A few shreds in the first glass, which contain no gonococci. Some blood and pus in the second glass. Has noticed blood in urine at times. Anterior urethra healthy; prostatic urethra congested on right side; bladder healthy. The right side of the prostate is the larger, nodular, and a fluid containing blood and pus is readily pressed out of it. The spermatozoa are motionless. Stains for the tubercle bacilli and gonococci negative.

4/14/08. I have treated him by prostatic massage, dilation of the prostatic urethra, irrigation and local applications, together with internal medicines, weekly, since last August, with improvement, the bleeding is less, the spermatozoa are now large and active, and the prostate less hard, but the infection still persists. In February for the first time we found gonococci. A culture prepared this month by Dr. Martyn shows the infection to be a mixed gonococcus and staphylococcus albus one. He shall receive the vaccine treatment.

An entirely typical example of malignant disease of the prostate as a cause of hematuria is given in the very first case cited in this paper. It is noticeable that pain was not a marked symptom in any of these cases. But the presence or absence of pain is not constant, and not to be depended upon in a differential diagnosis. Though many symptoms are common to prostatic and vesical hemorrhages it is often only after the most rigid examination of the whole urethra that the bleeding can be positively located in the bladder.

The hematuria from mechanical injury to the deep structures of the perineum, urethra, and prostate arises soon after the violence and always requires perineal section as a protection against urinary infiltration, and frequently for the control of the hemorrhage.

10. 3/14/03. M. W., 73 years old. Five days ago in stepping out of a buggy he fell astride of the wheel. He was instantly seized with a desire to urinate, but could not. He was taken home and his physician passed a catherer without great difficulty, and succeeded in doing so the following day but with great difficulty. The urine was very bloody. This catheter was left in position for two days, but becoming filled with clots it had to be removed and then could not be replaced. When he was brought to me no urine had passed for 36 hours. A slight amount of blood was present continuously at the meatus. Perineal section disclosed a complete fracture of the urethra. The distal end was found 6 cm. posterior to the anterior. The bladder was evacuated of blood and clots and the two torn ends of the urethra trimmed and united on the roof with fine catgut. Uneventful recovery.

The most common cause of vesical hematuria is the congestion accompanying simple vesical inflammation, cystitis, more especially cystitis of the trigone. The causative influence of the cystitis may be the gonococcus, in which case the bladder will eventually be the seat of many patches of intense inflammation and sometimes of ulceration; the colon bacillus; the pus producing cocci; the typhoid bacillus; or the bacillus-ærocapsulatus. Once in a while the pathological change noticed will be a velvety edema of the interureteral fold, and all, or a portion, of the mucous membrane about the vesical outlet. This is due to the interference with the venous circulation, and is particularly prone to occur in women who have displacements of the uterus. As an example I cite the following case:

11. 1/7/08. Mrs. S. S., 58 years old, came to me with diagnosis of stone or tuberculosis; has excessive urinary frequency with pain, which commenced about three years ago, and has progressively become worse, until it is now every fifteen minutes during the day, and hourly at night. The urine is frequently bloody. She has prolapsus of the uterus, a large cystocele, and a rectocele. No ulcer or growth in urethra. Cystoscopic examination:—no stone, growth, or ulcer; but an intense cystitis with edema, most marked on the right side. Urine alkaline, contains blood, pus, and bacteria. Total solids 8 grammes for the 24 hours. Under spinal anesthesia we amputated the cervix, repaired the perineum, and raised the bladder base. 3/30. The bladder will now hold from 90 to 150 cc without pain.

All of these cases are painful, and all are of everyday occurrence and easily detected by the cystoscope.

There is, however, another condition which occasions much vesical irritation, frequency of urination, and sometimes hematuria, but not often any definite pain:—in this the capillaries of the posterior slope of the bladder, from the vesical outlet to the ureteral openings, become greatly dilated and increased in number, veritable masses of blood vessels that look like the fine red mosses of the sea, when viewed through the clear liquid in the bladder. I have never yet been able to satisfy myself as to the cause which works to produce this telangiectasic condition, or to devise a method for its cure.

Tuberculous ulcers of this region frequently occasion severe hemorrhages, and, as in the case of ulcerations from other causes, microscopic investigations will discover blood in the urine so long as they are unhealed. In the acute genito-urinary tuberculosis which one sees often enough attaching itself upon a subacute or chronic gonorrhea in young men between 15 and 25, the hemorrhages from these tuberculous ulcers of the trigone and vesical outlet are peculiarly distressing, alarming, and depressing. The urine is expelled every few minutes with spasmodic contracture of the abdominal muscles and intense pain, blood comes in it and blood comes after it. The sick man becomes so absorbed in the presence of the blood, and so horror stricken by it, that he forgets all of the other symptoms and begs only to be relieved of the hemorrhage.

12. 3/12/1898. Wm. V., aged 19 years, single. Contracted gonorrhea two years ago from which he has never recovered. He has had great urinary frequency for a year, together with hematuria. Urination takes place every 15 minutes; clots are passed with the urine, and fluid blood follows it each time; the pain attending the act is atrocious. He is emaciated, pale and feeble. The treatment he has received has been barbarous, consisting of distention of his bladder by strong solutions under high pressure and the passage of large sounds. The urine contains gonococci and tubercle bacilli. The prostate and seminal vesicles contain tuberculous nodules. His bladder capacity, under chloroform, is 120 cc. Numerous tuberculous ulcers could be seen with the cystoscope on the fundus and in the

trigone. By appropriate treatment this boy improved so much that he was apparently well by September of the same year. In December he contracted gonorrhea a second time. This extended promptly to his bladder, giving the excuse for a fresh outbreak of his tuberculosis; terrific hemorrhages followed. Later he was attacked by tuberculous meningitis from which he died in March of the following year. His chief complaint was always the hematuria.

In dilating strictures, and in stretching the urethra for the better attack upon chronic purulent infections of its glands, many make the mistake of depressing the handle of the instrument well down between the thighs, thus bringing its point violently against the vault of the bladder, and producing bruises or abrasions which afterward form ulcers, and become the seat of tuberculous infection. I have seen many such cases and when present they are naturally always accompanied by the presence of blood in the urine.

13. 8/7/1893, J. T. C., 27 years old, coachman. An attack of gonorrhea in 1891 was followed by spasmodic stricture. Following exposure to rain and cold came a cystitis which was treated by sounds and severe injections, at the hands of an incompetent. Present frequency, every twenty minutes; bladder capacity 40 cc. Urine always bloody. It was the habit of the operator to force the sound in, depress the handle between the thighs and keep the instrument there for five or ten minutes each day. I put his bladder at rest, and, after the subsidence of the very acute symptoms, a cystoscopic examination was made. There were three large ulcers on the vault, where the point of the sounds introduced in the manner described would naturally touch; originally traumatic, they had become tuberculous. There were many miliary tubercles to be seen in the bladder. The man eventually was cured, under appropriate medical, and surgical, treatment.

In old men who suffer difficulty in urination from an obstruction due to an encroachment of a growth in the prostate pressing upon the canal, hematuria is a very frequent symptom. It may come from simple congestion, the hemorrhage arising by the breaking of an enlarged blood vessel by muscular strain or by pressure; or it may be primarily induced by clumsy or unfortunate efforts at catheterization; or by the violence occasioned by the efforts to expel hard fecal masses from a distended rectum. While the presence of hemorrhage, in a case of enlarged prostate, is by no means to be interpreted as a sign of malignant degeneration of the gland, yet it may always give occasion for thought. It is often severe and long lasting when due to an ulcerated surface occasioned by muscular force applied at intervals to some boss or lobe protruding into the urethra, or projecting upon a pedicle into the bladder.

14. 9/18/07. H. B. S., 78 years old, college professor. Has had urinary frequency and obstruction for several years; ill and confined to bed for two months. Urine, blood stained; tenesmus extreme; hemorrhage at times very severe. 10/14, cystoscopic examination shows a pedicled tumor, ulcerated and bleeding, projecting from the left side of the prostate, into the bladder. 10/15, perineal prostatectomy and removal of growth. Miscroscopical examination by Dr. Black demonstrated it to be a simple adenoma which had undergone inflammatory changes. Perfect recovery of bladder function.

The most natural place to discuss hematuria due to the presence of stone in the bladder is in juxtaposition to that following tuberculosis, for the latter mimics the former, in all of its symptoms, so closely that many a man has been, where dependence has been placed upon the classical symptoms, cut open for a calculus that did not exist. Of course the two conditions may exist together, which is doubly distressing.

I have seen vesical stones, almost pure urates, so smooth that I can conceive how they might lie in a healthy bladder for a long time, and gradually increase in size, without causing cystitis or hematuria. But in an experience of about 150 vesical calculi I have in each case found blood present in the urine, but not by any means always in quantities that could be recognized by the naked eye. But to be sure of the presence of stone one must either strike it with the searcher, see it with the cystoscope or grasp it bimanually.

In the absence of Bilharzia and hemophilia about the only other cause of hemorrhages from the bladder is a new growth, either malignant or non-malignant, and the difference is often difficult of distinction; for all tumors occuring in the bladder are, however innocent they may appear, under the ban of suspicion.

In a papilloma the bleeding is usually symptomless. In a carcinoma or epithelioma it may be painless or painful, according to the amount of infiltration and stiffness of the detrusor, and of the presence or absence of ulceration and vesical infection. In either case the hemorrhage is apt to follow compression or tearing of the tumor by forcible contraction of the muscles of the abdomen upon the bladder, that viscus being partially filled with urine, and the muscular effort being great; usually in the effort to avoid a blow or jolt or a fall. After an interval of rest the hemorrhage may subside entirely and the case remain symptomless for years and then another and freer hemorrhage take place.

15. 3/14/06. G. R. C., 60 years old, speculator. Four years previously he had a severe hematuria which lasted two weeks. In February of this year he helped lift a heavy loaded wagon from a rut where it was mired, and immediately afterward passed a large quantity of bloody urine. This also subsided under rest, and the use of ergot and hammamelis. He consented to a cystoscopic examination, at which time a large and long-pedicled papilloma was found. Operation at the time was refused, but later requested, during an intense hemorrhage in June of the same year; this also followed great exertion. The tumor was removed by excision through a supra-pubic wound. The man is still alive and there has never been any more bleeding.

The painless hemorrhage of carcinoma of the bladder before infection is very well instanced in the case which follows:

16. 11/26/04. Mrs. George S., 67 years of age, patient of Dr. Follansbee. At fifty-nine had her first attack of hematuria, which was painless. After this came other hemorrhages at irregular intervals. Within the past two years any unusual exertion or even the taking of a warm bath would be followed by the appearance of blood in the urine, but there was no pain until about ten days ago. 11/23, cystoscopic examination; a large papillomatous growth with a short, broad pedicle was seen on the right

upper quadrant. 11/29, supra- pubic cystotomy; removal of the large growth and four lesser ones by excision; many smaller nodules were found and destroyed by rongeur and cautery. The large growth was a carcinoma; the lesser ones papillomata. I saw this woman in the spring of 1907; she had been very well, without hemorrhage or pain, in the interval.

But occasionally pain may be complained of from the start in carcinoma, and hemorrhage is irregular and not very great, requiring microscopical examination for its detection. I have noticed this several times where the vault of the bladder was the seat of the affection. The pain is not like that of stone and does not disappear with rest; is constant and in the same place, and is not unfrequently referred by the medical examination to adjacent organs as witness this case:

16. 3/12/08. L. A. McK., 43 years old, mining operator; referred to me by Dr. Rose Bullard. He has suffered for years with pain in the bladder and over the middle of the abdomen, chiefly on the right side. Urinary frequency has been present all of the time and has now increased until it is every fifteen minutes. The pains were referred to his appendix by a medical adviser and in November, 1906, this organ was removed but no relief followed. His urine is acid and contains pus, bacteria and a moderate quantity of blood. With a cystoscope a large growth, with a broad, flat pedicle, can be seen upon the right side of the bladder vault. Operation deferred.

In rupture of the bladder there is always hematuria. This condition is easy to surmise, as it is occasioned almost invariably by great physical violence to the pelvis, and often accompanied by fracture of the pelvic bones. The bladder is usually full at the time of the accident and its contents escape either intra- or extra-peritoneally. In either case some urine is passed from time to time or is withdrawn by a catheter. Fluid introduced will nearly always escape through the laceration. Immediate surgical measures for its treatment are imperative. The tear should be sought, without loss of time, through a supra-pubic opening, which is best made into the peritoneal cavity.

In the hypertrophied bladder of urethral obstruction, if great care is not exercised in the primary use of the catheter, irreparable damage is often done by the too rapid removal of the negative pressure from the blood vessels; the resulting hematuria may last for a very long time, or even be fatal.

Hemorrhage from the ureter: When we see blood puff forth from the mouth of a ureter, like red smoke from the stack of a locomotive, is it possible to speak confidently of the lesion which produces it as ureteral? Except in rare instances, no. This is as far as we can see. Beyond this point the best we can do is to locate a stone, by aid of the magic power of the Roentgen ray, or by the passage of wax-tipped sounds into the ureter. That there is no obstruction, can be told by the free entrance of a catheter to the pelvis of the kidney. But this does not assure us of the nonexistence of a growth, or a tuberculous ulcer, in the ureter; nor is there any essential difference between the attacks of colic induced by the passage of a slough from a tuberculous lesion, a calculus, or a blood clot large enough, or firm enough, to excite nonrhythmical contractions of the tube. Lesions of the ureter itself, a simple sewer pipe, are uncommon, and when a hemorrhage is once located as coming from either ureteral mouth, it may confidently be assumed in nearly every case that we have to deal with a diseased or injured kidney, and this brings us to the discussion of the causes of renal hematuria.

The kidney substance, lacerated or torn by force; its mucous membrane irritated or torn by the pressure of a stone; deposits of tubercle in the cortex with congestion, or in the pelvis with caseation and the formation of slough; malignant tumors infiltrating its tissues; angiomatous degeneration of a pyramid; diseases of the adrenal; displacement, a shower of uratic or oxalic crystals; papilloma, multiple cysts; echinococcus, nephritis, acute and chronic; and sometimes a trophic change, which may not be detected by the microscope, but nevertheless exists and allows the blood to drip through the tissues as water from a sponge; may be the cause of the bloody urine. To these may be added the effects of such drugs as turpentine, phenol and the Spanish fly.

Fracture of the kidney has been known to follow (1) a push or blow against the abdomen or body; the individual moving strikes against some object; or the individual being still, is struck by some moving object. The injury is usually in proportion to the force exerted, but not always. (2) By lateral pressure, the body being caught or squeezed between two opposing forces. (3) By sudden compression of the organ against the spine or ribs in the exertion of great muscular effort; as in wrestling, or severe lifting, in which the person is obliged to stoop and lift directly upward. (4) By transmitted force; the kidney being thrown suddenly, by the tensely contracted abdominal muscles and the diaphragm, against the ribs and the spine. Fortunately the kidneys are so placed and protected that this cause of hematuria does not often obtain; such injuries, according to Kuster, constituting less than 3 per cent of all surgical diseases. They are always serious injuries, and whenever hematuria follows an accident of the nature I have described, cystoscopic examination, if the source is not self-evident, should be immediately made, and the kidney at fault cut down upon and mended if possible, or removed; for if there is enough injury to cause the appearance of blood in the urine, the capsule of the kidney will also be found torn, and blood and urine will escape into the surrounding cellular tissues. Delay in such cases means long invalidism and often death.

8/10/06. Jno. M., 40 years of age, shopkeeper. Injured in a trolley wreck after which he was unconscious for two days. Bloody urine drawn by catheter soon after the accident. When he recovered consciousness he arose and walked to the toilet after which he passed a large quantity of liquid blood. 10/30, all hemorrhage had ceased, but the urine contained pus. He came under my care 11/14 with recurrent hemorrhage, chill and high temperature; thoroughly septic. I made a lumbar incision and at the bottom of a perinephic effusion of clotted blood, pus, and urine, found the kidney which was torn transversely from before backwards, a little

above the middle of the organ. The separation was almost complete, the poles were united only by the tissues of the hilum and a thin piece of the cortex. The lower fragment was split longitudinally and posteriorly, almost two-thirds of its length; and there were also several star-shaped fractures. There was no chance for a successful plastic operation, so the kidney was removed. Recovery.

An artery of considerable size may be torn, and the hemorrhage, alarming at first, may become stilled. In intervals of apparent progress to recovery, after some exertion, the thrombus may be displaced and there may be repeated hemorrhages which result in extreme debility, anemia and infection.

17. 10/20/02. J. M., farmer. Patient of Dr. Dilworth and Dr. Beckett; 38 years old; was thrown from his buggy in a runaway accident and struck his right loin against a heavy piece of wood. A few minutes afterward he was found greatly shocked, pale, collapsed and suffering exceedingly from pain in the abdomen. Two hours afterward he passed 1800 cc of bloody urine. The shock was prolonged and any exploratory operation was deferred. At the end of a week he had a second bleeding, so profuse that unconsciousness followed. A ureteral clot was again formed and so at intervals of five to seven days he had recurrent hemorrhages until December 21st, when I saw him in consultation with Drs. Dilworth and Beckett. The urine contained blood and pus and there was a marked tumor in his side. The kidney was cut down upon and found lying at the bottom of a perinephric cavity containing blood clots, pus and urine. It was torn irregularly across its body a little above the center, and standing up in the ragged tissue was a large arterial branch that had been torn squarely across by the force of the crushing blow. The reason for the relapsing hemorrhages was plain. At intervals the clot in this vessel would become dislodged by some muscular exertion following the accumulation of a little strength. Even as we examined it the clot was forced out and it commenced to spurt. We ligated it, freshened the torn edges of the kidney and brought them together with a few cat-gut stitches, thinking we might save the kidney. The wound was drained but infection was too great and on January 19th Dr. Beckett removed the kidney. Recovery complete and uneventful.

Hemorrhage from the kidney may be painful or painless. Renal calculus is commonly painful, but not necessarily so. Uratic stones are sometimes so smooth that they may be in the kidney a lifetime and give rise to neither pain nor bloody urine, unless ascending infection from the bladder, or tuberculosis, attacks the kidney, or the stone, being small, engages in the infundibulum of the ureter, produces congestive contractions, and ruptures some small bloodvessel. But stone in the kidney is often accompanied by atrocious pain; and if rough or branched, blood may be found by microscopic search at all times; while after muscular exertion, profuse hemorrhage takes place; this is more particularly the case in the presence of oxalate stones, the crystals of which, set at irregular angles, are as sharp as glass.

To establish a diagnosis, resort should always be had to a skiagraph of the kidney and ureter upon the side painfully disturbed. But even when once obtained full reliance may not be placed upon the shadow, for sometimes this agent is tricky, showing stones where none exist. The following case illustrates the point well, while also it may be used to illustrate the hemorrhage of malignant tumors of the kidney.

18. 12/7/07. M. J. S., 49 years of age; miner; patient of Dr. Baylis. Two years ago after lifting a heavy weight a free and painless hematuria appeared. This disappeared after a period of rest. At various times since the hemorrhage has been repeated. Painless at the outset, after a few hours it is always followed by an intense right-sided renal colic, which lasts from three to ten days. During the past six months the intervals have lessened and the amount of blood lost has been greater. No pain in the bladder and no increased frequency of urination. An inspection of the interior of the bladder shows it to be a healthy viscus and both ureteral openings to be of normal size and appearance. Urine obtained from the right ureter contains some blood and pus but no other cells, casts, or organisms. A suggestion of exploration of the right kidney was declined. January 9th hemorrhage repeated. From the character of each hemorrhage at its onset I told him I believed his trouble to be a papilloma, probably non-malignant, projecting into the pelvic of the kidney, the pain being caused by the subsequent pressure of the clotted blood. We had a skiagraph taken, which is presented herewith, and from it the diagnosis of stone was made. The picture shows four shadows, two in the kidney and two in the ureter. January 16th, nephrectomy through an Abbe incision; exploration of the ureter being deemed necessary. As soon as I seized the kidney I found I was dealing with a malignant growth and removed it entire. There was no stone in the kidney substance and none in the ureter. What caused the shadows? I do not know. The tumor is a misplaced adrenal which had grown through the lower pole of the kidney, from the outer side, penetrating the pelvis, and there forming a soft polyp, practically a papilloma, which was the source of the blood in the urine. Recovery was prompt and perfect. This brings me to a case of malignant renal growth which was believed to be pyelitis occasioned by calculus.

19. 2/10/07. E. E. N., 36 years old; bank cashier. Patient of Dr. Hamman. For three years he has had dull pain in the left loin which at intervals became colicky, and was accompanied by blood in the urine. He has never sought medical aid but once, and then he was told that his trouble was kidney stone. For several weeks he has been unable to work, has had temperature, chills, blood in the urine in small quantities, and during the past few days some pus. The whole of the left side of the abdomen, and about one-third of the right side, is occupied by a tumor which makes these tissues and those in the loin bulge like a drum head; the superficial veins over its whole surface are enlarged from the interference with the circulation by its pressure; its bulk, interfering with the play of the diaphragm, has increased the respiratory rhythm to 30 per minute; he suffers from colic, by the interference of the tumor with free exit of gas from the intestines, and has not had a passage from the bowels for a week despite the administration of severe cathartics. He is emaciated from inability to take food. The tumor examined bimanually seems to fluctuate. He was believed to have a great abscess of the kidney from the ureter being obstructed by a stone, or a malignant growth, perhaps both, with the preponderant history in favor of stone. The kidney was cut into by a free straight incision in the back. It was adherent to the muscle plane. When the capsule was cut through and a pair of forceps preceding the exploring finger was pushed deep into the kidney substance the blood spurted forth like water from an artesian well. I thrust my finger down into the pelvis of the kidney seeking the stone and the pus, but there was none there. The tissue

was as friable as rotten sponge and broke into masses in all directions. It was sarcomatous. I packed the wound and left everything open the better to relieve tension. After the operation the breathing became of normal frequency, gas was passed, the bowels moved in a few hours and all pain ceased. When the great tension was relieved it was noticed that the lymphatics in the skin of the abdomen and in the groin on the left side were enlarged. He was given Coleys fluid for about four months. The tumor and the swollen glands disappeared and the following September his physician reported him to me as well and working at his desk in the bank.

Case reports are made from time to time of persistent one-sided hematuria in which, after the splitting of the kidney in situ, or its removal, no definite pathological change in its tissue can be noted. I have recorded an instance of such indefinite trophic change elsewhere, and have referred to the same case earlier in this article.

Fenwick has called attention to another strange change in a limited portion of the kidney structure, which, easily overlooked by the uninstructed, provokes serious hemorrhage, and is readily cured without removal of the kidney. I refer to angiomatous changes in one of the papillæ.

19. 1/29/07. O. A. C., 45 years old; printer; patient of Dr. Hamman. Two weeks since he was attacked with a symptomless hematuria, which has been continuous and extremely severe. Cystoscopic examination shows a healthy bladder, and the emission of blood from the left ureter. January 21st, examination of the kidney and ureter through an S shaped incision in the loin. As no clots could be seen coming down the ureter when it was rolled up on the peritoneum, it was opened and explored toward the bladder, while a small silk catheter was passed up to the pelvis of the kidney. No obstruction was felt in the pelvic part of the ureter and the water used to flush the tube was not stained with blood as it issued from a catheter in the bladder. A very few drops of blood came from the catheter in the kidney. The kidney was brought out upon the side, split open from pole to pole and the entire pelvis and each calyx with its pyramids examined closely. Everything was normal except a portion of one papilla in the upper pole, this was dark purple in color and bled continuously. It was removed by a wedge shaped incision, the sides were united by one stitch of fine cat-gut. The incision in the ureter was closed over a catheter which was withdrawn through the pelvis of the kidney. The mucous membrane of the pelvis was approximated by a few fine interrupted cat-gut sutures, and the two sides of the kidney brought together with a double row of mattress sutures tied loosely, and the wound drained by two ample cigarette drains, which were withdrawn in two and four days respectively. Recovery, uneventful and complete. No hematuria since.

Tuberculosis of the kidney is frequently the cause of hematuria of varying grades, depending upon the amount of tissue involved, the stage of the disease, whether miliary or caseating, and in the latter case upon the progress and situation of the ulcerating surface. In the hemorrhage which occasionally accompanies a thickly sown eruption of miliary tubercles in the cortex, the hemorrhage of congestion, pus has preceded its advent for some time, and the pain is only a dull ache in the back. Where a caseating nodule or gumma breaks down and erodes a fair-sized blood vessel, the hemorrhage is frequently great and prolonged, but is rarely or never painless, for the clots and sloughs obstructing the ureter give rise very quickly to attacks of kidney colic. But in cases of long standing though symptomless tuberculosis of the kidney with palpable tumor, we see, rarely enough, a painless and abundant hematuria which arises from a fine granulomatous growth, gelatinous, really polypoid, which fills the pelvis of the diseased organ like moss.

20. 3/7/03. F. N., merchant, 36 years old; patient of Dr. Moseley. He is of good antecedents and without any history of tuberculosis. In the summer of 1899 his horse fell upon him, and the horn of the saddle struck him over the left kidney. Immediately afterward he passed blood with the urine and has done so at intervals ever since. Often the urine would be clear for a few days and then a free hemorrhage would take place, this would gradually subside, there would be another interval without blood, and then the hematuria again. He has become very anemic, and lost thirty pounds in weight and is feeble. On February 28th of this year there was an alarming hemorrhage accompanied by much pain and a rise of temperature, and a tumor could be felt in the left loin. Cystoscopic examination shows a healthy bladder. Blood stained urine issues from the left ureter. Urine acid, contains some pus, and blood; but no tubercle bacilli. March 13/03. nephrectomy. The kidney was very large and adherent. It was tuberculous and filled with large caseating masses; its pelvis which was greatly enlarged, was filled with a large gelatinous mass of small polypoid growths from which the hemorrhages came.

The history is clear: injury, bruising of the cortex, a tear in the mucous membrane of the pelvis, formation of granulation tissue, polypoid growths, which, easily lacerated, bled easily and frequently; deposit of tubercle bacilli in the injured kidney tissue; formation of tuberculosis foci, caseation, chronic inflammation and adhesions. He was entirely well for two months and has remained well ever since.

Multiple cystic kidney is looked upon as such a hopeless disease that the advice is given always to let it alone, and as I can find no record of hematuria being one of its salient symptoms I report the following case.

21. 9/12/07. J. B., farmer, 63 years old; patient of Dr. Bacon. Has kidney cachexia. He has been very ill for a month and running temperature from 100° f. to 104° f; has attacks of pyuria and hermaturia. Both kidneys are enlarged, the left occupies all of that side of the body, and a little more, and is very tender and tense. The right kidney is enlarged and not tender; breathing and bowel movements interfered with by pressure. Twenty years ago, four years ago, and one year since he had similar attacks, in which there was blood in the urine. Cystoscopic examination with catheterization of both ureters. Bladder healthy, both ureteral openings enlarged but neither ulcerated. Urine from right kidney acid, specific gravity 1020, a few pus corpuscles, and a very few red blood cells present. The left kidney secreted nothing. I made a diagnosis of probable bilateral malignant disease.

October 13th, through a long anterior incision the kidney was exposed and found to be a multilocular cyst. All of the cysts that could be reached through the incision were opened and the division walls removed with scissors. Most of them contained clear, some bloody, and some purulent fluid. The pelvis of the organ was greatly dilated and was full of

very thin pus. There was but little bleeding. The pressure was greatly relieved, and pain, temperature, and asthmatic symptoms, ceased immediately. The swelling of the right kidney disappeared and after great trouble, for he was very feeble, the wound healed, without suppuration. He made a good recovery and is apparently well, at least well enough to get some pleasures out of living and to transact business.

In dislocated or movable kidney abundant hemorrhage occurs, from time to time, and is usually painless, and probably induced by pressure congestion, from obstructed circulation.

22. 2/19/08. Mrs. D. H. W., 39 years old; patient of Dr. Sheppard. Has had painless hematuria for two weeks without great urinary frequency. She has pain in the back which is worse in the left side. There are no other subjective symptoms. Both kidneys are enlarged and both displaced; the right is a true floating kidney. Cystoscopic examination:—urethra and bladder healthy, blood to be seen issuing in steady regular jets from the right ureter. Operation deferred.

Echinococcus is said by some to be a cause of renal hemorrhage. I have never met a case, but one would think that in the microscopic examination of the urine the hooks would be surely found at one time or another. Nephritis, too, either acute or chronic, frequently is the cause of hematuria. But in chronic nephritis, even if it be one-sided, there is the albumen, which is present after the precipitation and removal of the blood; there are the casts in the intervals of the hemorrhages; and also the cardiac and stomachic symptoms to aid in diagnosis. Still there are some cases of chronic Bright's, in which one-sided, persistent and depleting hemorrhages have been reported which must be very puzzling. It is to be recollected, however, that surgical interference, at least so far as the relief of tension by splitting the capsule, can do nothing but good. I have thus endeavored to present to you the subject of hematuria, illustrated by cases which have been interesting to me, and which have helped teach me the complications of a subject simple in itself but very diversified as to its anatomical origin and histological causes.

In the treatment of this symptom, usually surgical measures are to be employed. But even so, to gain time, the use of epinephrin, ergot and hammamelis, morphia when needed, a bland diet, and above all, rest, are not to be overlooked. Absolute forbiddance of all alcoholic stimulants is necessary.

Discussion.

Dr. H. C. Moffitt, San Francisco: Dr. MacGowan has covered the subject so fully that there remains very little for me to discuss. In my work it is natural for me to come across renal hematurias resulting from tuberculosis, stone or new growth. I would emphasize that with regard to the new growth the Grawitz tumor seems very common in California, the next commonest place to its occurrence in Vienna. A very long silent period may come after the initial hemorrhage in the new growth. I remember a young man whom I saw some years ago who had had his first hemorrhage four years before any serious symptom attracted attention to the kidney. It is well to remember that hemorrhage of hypernephroma may be profuse. I remember a case in which the later hemorrhage was so profuse as to lead to a diagnosis of aneurism of the renal artery. These hemorrhages, although profuse, may stop absolutely. I have in mind a case of Grawitz tumor with hemorrhages recurring frequently, particularly after exhaustion or indulgence in an undue amount of beer. Between these hemorrhages the urine was free from any macroscopic blood. Some weeks ago a man came into the hospital with a history of spitting blood. He had a tubercular reaction and deformity of the spine and an unusually lumpy tumor in the abdomen. The whole condition was regarded as tuberculous until the history of hematuria called more attention to the kidney. The diagnosis of Grawitz tumor was confirmed by autopsy. It has not always seemed easy to me to tell the hemorrhage that comes in certain cases of nephritis, particularly in old men, from a complication with renal stone. Of course the history helps out in our judgment. A continued examination of the urine will help us in our diagnosis, as there are cases of nephritis in which hemorrhage is a recurrent symptom. These cases have been emphasized by Askanazy. It is not always easy at the bedside to trace the source of a few red blood cells which appear in the urine. It seems well to remember that any acute abdominal pain may give rise to no symptoms except a severe intermittent pain in the lumbar region. Almost constantly there were red blood cells present. I have in mind another case of a child in which there was a large irregular tumor of the left lumbar region which seemed definitely to be a kidney tumor. Even without the severe attacks of pain the red blood cells were found frequently in this urine. A diagnosis of renal sarcoma was made until the increasing irregularity of the tumor and occurrence of symptoms elsewhere led to a readjustment of the opinion and a diagnosis was made of tuberculous glands in the abdomen. I have in mind a large tumor of the right lumbar region in which a diagnosis seemed perfectly plain of a large renal tumor. The ordinary methods of diagnosis were applied and seemed to prove. There were constantly red blood cells in the urine, but abdominal section showed no tumor of the kidney but a retroperitoneal tumor. Not only are we going to make the diagnosis with the help of catherization of each kidney and the cystoscope and the X-ray, but we must bear in mind the general aspect of the case. Unless we take a whole clinical picture we are going to be led astray by the hematuria as we are by other symptoms which seem to be perfectly definite.

Dr. W. W. Beckett, Los Angeles: I have not much to say on this very important subject, but I want to thank Dr. MacGowan for his exhaustive paper. This is a branch of medicine somewhat out of my line, but the diagnosis, as in other cases along the urinary tract, is so important that unless it is a very simple case I usually send them to Dr. MacGowan. Those cases where there is a prolapse of the bladder are very frequently benefited and cured by anterior colporrhaphy. Another condition which I think the doctor did not mention is that of slight hemorrhage coming from caruncles within the uretha. Hemorrhage coming from the kidney, as Dr. MacGowan mentioned in the trauma case, was exceedingly interesting. That case went along about two months before removing the kidney, and several times the patient was aparently well and there was no blood in the urine whatever. At the first operation the kidney seemed to be in good condition. At the second operation the vessels leading up into the kidney were entirely occluded, and while the kidney had not sloughed the circulation was entirely cut off from the renal substance.

Dr. W. F. B. Wakefield, San Francisco: My experience with hematuria has been somewhat limited. There are two things which have impressed me in

the study of ten or twelve cases, and those were the relative frequency of a tuberculosis of the kidney and the relative frequency of the condition of which Dr. Moffitt spoke—the Grawitz tumor. It seems to me that tuberculosis of the kidney is much more frequent that usually supposed and that the symptoms are misleading on account of its being somewhat difficult to demonstrate the tubercle bacilli in the urine. I am quite impressed with the opinion that tuberculosis of the kidney is a relatively frequent condition and much more frequent that we generally deem it to be. Oftentimes rather slight symptoms will point to a tuberculosis of the kidney where the bleeding is relatively very limited. On the other hand sometimes we will have enormous hemorrhages from a kidney with practically no symptoms at all. Very recently a case passed into my hands which surprised me by the amount of blood that was lost, with absolutely no other symptoms. The urine, however, was loaded with tubercle bacilli. Why hypernephroma should be rather frequent in California I do not know, but there are few of us who have had experience with abdominal surgery who have not met one or two of these cases. Yet one would judge that the Grawitz was a comparatively rare condition. In San Francisco so many have come before my notice that it does seem as Dr. Moffitt has suggested that here it is a relatively frequent condition.

Dr. MacLaughlin, Pasadena: I have had some experience the last year which has led me to recognize the difficulty offered in interpreting the meaning of hematuria which should be regarded as a symptom. I think in every case of hematuria it is very important and we must regard it purely as a symptom and that the clearing up of the diagnosis sometimes requires a great deal of work. I am sorry to say that very little of this work has been done by the average general practitioner. Recently I had a case of a woman with hematuria who had been advised by four doctors to have the kidney removed. On cystoscopic examination the bladder was found to be normal and upon catheterization normal urine was found to be coming from the side supposed to have tuberculous kidney, and bloody urine and pus coming from the opposite side. This proved to be a stone on the side opposite to that where the tumor was supposed to be. I could report two more cases in which the operation was finally done on the side opposite to that supposed to have the trouble. Another point in these cases is the importance of rest. I had a man from a mining camp who had been injured with a large chunk of coal on the left side, with an immediately following hematuria. This persisted for three months in spite of all treatment. He passed large quantities of blood, in fact so much that he was anemic. There were no other symptoms and no pain. I did nothing for him except to order rest in bed, and in three weeks his hematuria had completely disappeared. Another class of cases are those of stone. Frequently we hear of a kidney lesion simulating a stone with hematuria. I do not hear so much about it now. That is simply because the great majority of these cases can be cleared up by frequent microscopic examination and X-ray pictures. Ninety-nine out of every one hundred cases where we get hemorrhages simulating stone in the kidney, it is actually stone. I had three cases recently in the hospital, all of whom had blood in the urine and all were supposed to have stone in the kidney, but all cleared up in a very short time. However, in every one I succeeded in finding a small calculus which was passed while the patient was under my observation. A great many of these cases are due to a sudden passing of a stone while the patient is under observation. Careful observation should be made of the urine in every case of hematuria.

PENTOSES. *

By MR. A. HALDEN JONES, Los Angeles.

Pentoses occur in nature in many fruits, e. g., cherries, plums, huckleberries; in vegetable gums, as gum arabic or gum acacia, in cherry gum, also beet gum from our sugar beet. Here they exist as pentasones which are polysaccharides, for the five carbon sugars as starch is for the six carbon sugars. Pentoses occur in marine plants; they have been found in several varieties of seaweed. The lignin test, which is used by botanists to demonstrate the site of wood-formation in the growing plant depends upon the presence of wood sugar which is a pentose. Pentoses also occur in the nucleic acids of many plants—in fact, the yeast plant furnishes a convenient source of nucleic acid.

In the animal body many nucleic acids containing pentose radicals lie in close relation to the process of life. You will remember that the nuclein of the physiological chemist is the same as the chromatin of the histologist. Such nucleic acids have been demonstrated in the pancreas, liver, spleen, thyroid and brain; also, in the head of the spermatozon.

From the standpoint of pathology, pentoses sometimes are of considerable importance. Some sarcomata possess a high pentose content. And again, we find cases of chronic pentosuria. This condition persists on a pentose free diet. Pentosuria is not of grave clinical significance, yet if it is mistaken for diabetes mellitus it may be the cause of much needless worry and trouble to the patient. And, moreover, the diabetic diet does not influence the amount of pentose excreted. The observation has been made repeatedly (Sahli) that such cases are injured by the strict dietary of the more grave disease. In such cases, as those just cited, chronic pentosuria and malignant tumors, the five carbon sugars must be a product of metabolism. Whether this is a product of perverted metabolic or enzymic activity, or whether it is an exaggeration of the process which provides normally the pentose for nucleic acid, is a matter of conjecture.

When fruits containing pentose are ingested a temporary pentosuria, and so-called alimentary pentosuria, readily is obtained. The amount of pentose excreted bears a direct relation, of course, to the amount ingested. Not all of it is excreted. When ingested pure, these sugars pass the easist of all into the urine. And in the case of xylose, may be demonstrated after the ingestion of only 0.05 grm. (Emerson.)

Several questions arise concerning the role of pentoses in plant and animal physiology. Some of these questions may be mentioned here: First, why does the plant store pentoses in the fruit? Is it for the growing embryo? Why does the plant use pentose in preparing lignin, its so-called skeleton—even in the maple tree, which certainly has plenty of other sugars available? In the case of the

* Read at the Thirty-Eighth Annual Meeting of the State Society, Coronado, April, 1908.